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AUTHOR Bartlett, B.J.; And Others
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ABSTRACT

A study assessed whether young readers might be induced to use a memory strategy. Subjects were an intact class of 25 fifth grade students taught to use text structure as an organizational strategy, and 29 students in a second class who received no instructional intervention. On three occasions, the 54 students were required to read a test passage, write a free recall, and respond to a written probe of their awareness of organizational structure in the passage. Posttests were administered the day following the completion of training and three weeks later. The results revealed superior comprehension and memory performances for those students in the treatment group. Additionally, members of this group were able to use the strategy to cope with poorly organized text and when writing their own compositions. (FL)

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Top-Level Structure : A Significant Relation for What Fifth-Graders Remember from Classroom Reading.

BARTLETT, B.J., TURNER, A., and Mathams, P.
Mount Gravatt College of Advanced Education, Brisbane, Australia.

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Abstract

Repeated measures of free recall were analysed for an intact class of 5th graders taught to use text structure as an organizational strategy for remembering classroom text, and for a second class which received no instructional intervention. With pretest performance statistically controlled, an analysis of covariance revealed superior comprehension and memory performances for those in the teaching treatment. Additionally, advantages in unmuddling confused text and in generating written composition were demonstrated by users of the strategy.

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Top-Level Structure : A Significant Relation for What Fifth-Graders Remember for Classroom Text

B.J. BARTLETT, A. TURNER,
R. MATHAMS
Mt. Gravatt C.A.E.

B.J. BARTLETT,
Mount Gravatt College of
Advanced Education,
P.O. Box 82,
MOUNT GRAVATT. QLD. 4122
AUSTRALIA

The purpose of this research was to assess whether young readers might be induced to use a memory strategy. The target strategy involved recognition of the major organizational frame (top-level structure) in passages of text and use of that frame in retelling.

Four supplementary aims were followed. These were (a) to record spontaneous use of the target strategy, (b) to tabulate consistency of spontaneous use across different test performances, (c) to measure memory and comprehension performances associated with spontaneous and induced use of the target strategy, and (d) to determine any association between teacher ratings of student reading ability and selected measures of memory and comprehension of classroom text.

INTRODUCTION

Recent investigations of how readers structurally organize material remembered from text have provided information about comprehension and memory performances with prose. For example, Meyer, Brandt and Bluth (Note 1) have reported that ninth-graders who are good comprehenders tend to retrieve information within an organizational framework (top-level structure) much the same as that of a text they have read. Those who are poor comprehenders seldom do this. This difference is even more pronounced with older readers (Meyer, 1971, 1975). On the basis of such research it has been suggested (Meyer, 1975) that use of top-level structure from text enhances memory performance not only for text material in general, but also for the most salient information in that text.

A previously neglected question however, was whether metacognitive aspects of the use of top-level structure might influence instructional outcomes of a reading task. Bartlett (1979) investigated this possibility by controlling levels of reader awareness about top-level structure. This was done by giving ninth-graders specific instructions in the nature and function of text structure, in how to identify top-level structure in passages of text, and in how to apply the identified structure as an organizational frame for recall of text information. Results indicated that those who used the top-level structure remembered more than those who did not. However, those who remembered most were subjects who were deliberate in using it.

Knowledge about top-level structure and one's own skill in using it strategically seem also to influence the stability with which readers use the organizational technique. There is evidence (Bartlett, 1979; Brandt, 1978; Meyer, Brandt & Bluth, Note 1) that on any one retelling, nearly 50% of ninth-graders will use the top-level structure of text without specific instruction to do so. However, Bartlett (1979) noted that few use the technique consistently and found that instruction

aimed at developing metacognitive aspects of the technique produced more stable application of top-level structure as a deliberate, organizational strategy. Of those trained in Bartlett's (1979) research, 72% deliberately reproduced the top-level structure of the stimulus passages on both posttest performances. Only one of 49 untrained subjects performed similarly.

Little is known about natural use of top-level structure made by younger readers in their retellings. Elliott (1980) recorded an incidence of 25% among sixth-graders. However, Elliott (1980) did not measure whether subjects were deliberate or coincidental in utilizing the same organizational frame as that of a stimulus text. Nor was there a check on stability of the production across several retellings. In view of the inconsistent performance of controls in the Bartlett (1979) study, it may be that many readers are production-inefficient (Flavell, 1970) in applying top-level structure from what they have read to a memory performance. Thus, the incidence figure suggested by Elliott (1980), as with figures for college graduates (Meyer, Note 2), and adults of various ages (Meyer, Rice, Knight & Jessen, Note 3), may overestimate those who are deliberate in making organizational use of top-level structure, and, they may be unreliable.

Less is known about the sensitivity of younger readers to instruction aimed at a consistent production of top-level structure in deliberate and strategic organization at retrieval. While an induced production of such strategic behaviour may be a desirable instructional objective for older subjects (Bartlett, 1979; Bartlett & Briese, 1979; Brandt, 1978), it is not known whether the objective is either viable or useful for younger readers.

The present study was conducted in search of such information.

METHOD

Subjects

The study sample consisted of 54 children. This number, adjusted for the attrition of three absentees on one or more of the tests, represents two, intact classes of fifth-graders with one class of 25 children receiving the instructional intervention and the other of 29 children serving as a non-instructed control.

Materials

Test materials. A 120-word passage was extracted from a classroom, science text for fifth-graders which was not part of curriculum at the particular school. The passage included a heading "Muscles You Cannot Control" and in content analysis (Meyer, 1975) yielded 45 content units comprised of 24 idea units, actual words or groups of words from text, and 21 relation units, tha tacit bindings which relate an author's ideas into an overall communication. The comparison top-level structure of the passage included 16 content units.

Training materials. The instructional program consisted of 14 Student Workbooks and associated Teacher Manuals. Activities and workbooks were graded and sequenced with the objective that students become increasingly aware of the organizational properties of top-level structure in communication between writer and reader.

The program was taught daily over a period of three weeks, each session of about 50 minutes. Methods of instruction included guided discovery, teacher direction, peer tutelage, and self-pacing. Exercises and activities centered on a sequence of behaviours to be followed in identifying top-level structure in text and in applying the identified structure in organizing oral and written recall. In cases of muddled text where top-level structure is not readily identified, students were instructed to impose a structure. Three of the 14 Workbooks were used to implement awareness of structure in the student's generative writing.

Procedure

Subjects were tested on three occasions. On each they were required to read the test passage, write a free recall, and respond to a written probe of their awareness of organizational structure in the passage.

Following the first test, one class received an instructional intervention the other received no special training. Posttests were administered the day following completion of training and three weeks later.

Each subject's recall was scored against the content analysis of the test passage. Strategic use of top-level structure in organizing written recall was classified according to a seven-point scale suggested by Bartlett and Briese (1979).

RESULTS

Memory Performance

Number of units written in a free recall of the test passage is shown in Table 1. From a possible score of 45 units, recall on the pretest is similar for subjects of both groups. Incremental performance due to practice effects on the test passage might have been anticipated on subsequent tests, and improvement is shown for both groups on the first posttest. No further improvement resulted in performance on the second posttest. More extensive gains were made by those in the experimental group on each occasion. This difference in favour of the experimental group was significant and is illustrated in a later section.

INSERT TABLE 1 ABOUT HERE

As shown in Table 2, there is significant, positive relation between use of top-level structure and recall at each time of testing. Across groups, subjects who recalled most were those who applied the highest levels of the strategy. Such subjects deliberately used the top-level structure of the text to organize their written recall. Those who recalled least were subjects who made no apparent use of structure in retelling what they had read.

INSERT TABLE 2 ABOUT HERE

Performance in Applying the Strategy

Essentially, Bartlett and Briese (1979) claim that strategic performance may be represented at one of three major levels: use of the same top-level structure as in the test passage; use of a different structure; and, no apparent use of structure. Within each of these levels are sub-categories involving whether or not a subject identifies the organization used in reading and recalling the test passage. The categories constitute the seven-point scale shown in Tables 3 and 4.

Independent ratings of level of strategy applied in each recall performance were made by two scorers. Matched ratings were obtained for 154 of 162 records. In subsequent consultation between the raters, agreement was reached for the remaining records. Frequencies for subject performances are shown in Tables 3 and 4. Sub-totals are provided for the major levels.

INSERT TABLE 3 ABOUT HERE

INSERT TABLE 4 ABOUT HERE

Spontaneous use of the strategy. Prior to the intervention 30% of the sample, 16 subjects, spontaneously used the same top-level structure as that of the test passage in organizing free recall. A few, 10% of the sample, attempted to relate facts being recalled but did so with a top-level structure, or overall organization, different from that of the test passage. Most subjects, 60% of the sample, had no apparent organization in their written recall. These subjects tended to write accounts which were unsystematic listings of discrete bits of information.

Eleven of 16 who used the top-level structure for the test passage, did not identify the organization in response to a probe.

Consistency in spontaneous use of the strategy. As instruction in the strategy was provided for the experimental group following pretest, only performances of the control (N = 29) were examined for consistency of a spontaneous production of the strategy. Levels at which the target strategy had been applied were rated for this group and performances are shown in Table 4.

Across three test performances, four of 29 subjects twice attained ratings at the highest level of strategic application. These subjects on two occasions used the top-level structure of the test passage to organize recall, and were able to identify that structure. However, none obtained the maximum rating for all three performances.

Memory and comprehension performance associated with use of the strategy. Evidence of an association between memory performance and strategic use of top-level structure is recorded in Table 2. The relation is positive and significant.

Mann-Whitney Tests were used to compare distributions for those who did and did not recall gist (main idea) information of the passage. Significant, one-tained probabilities were obtained for each of the three sets of test performances indicating a positive relation between use of the target strategy and comprehension as measured by retrieval of main idea information (Table 5).

INSERT TABLE 5 ABOUT HERE

Relations for teacher ratings with memory performance and performance in applying the strategy. Teachers were asked to rate students of the experimental group on reading ability. Ratings were to correspond with the A, B, C groups levels sometimes used to stream classes for group reading.

Measures of correspondence between teacher ratings of students' competence in reading and students' performance in remembering text information and in applying the strategy are shown in Table 6. In only one case is a relation significant. A significant, negative relation was found between teacher ratings of students' reading abilities and student memory performance on the pretest.

INSERT TABLE 6 ABOUT HERE

Effects of Training in Use of the Strategy

Changes in performance in applying the strategy. Following the training intervention, levels at which subjects applied the strategy were recorded for both experimental and control groups (See Tables 3 and 4). Significance of changes from pretest levels were analysed for immediate and delayed posttest performances through Wilcoxon Z Signed - Ranks Tests. Statistics and levels of probability are shown in Table 7.

INSERT TABLE 7 ABOUT HERE

Effects on memory performance. Wilcoxon tests indicated that changes in levels at which the strategy was applied following the intervention were most significant for subjects in the experimental group. Effects of such change on recall performance were also found. In a 2 (treatment group) x 2 (time of posttest) analysis of covariance, with pretest recall performance statistically controlled, a main effect was found for treatment group. Inspection of the means revealed that those taught to apply the strategy produced more extensive written records of what they had read than controls.

No effects were found for time of posttest, nor for the interaction between treatment group and time of posttest. Thus, significance of the gain in memory performance for the experimental group shown immediately following instruction was still apparent three weeks later. Results of the analysis are shown in Table 8.

INSERT TABLE 8 ABOUT HERE

DISCUSSION

The reading process is complex, particularly when objectives of reading are to remember large sections of a text and to select the gist of an author's communication. As with older subjects, readers in this study who applied the target organizational scheme to a reading and recall of expository, classroom text outperformed others who did not.

A major finding was that with special instruction, fifth-graders could be induced to recognize top-level structure in passages of text, to use that structure strategically in retelling what had been read, and to benefit in terms of better memory and comprehension performance.

Spontaneity, Consistency, and Effects of the Target Strategy

Even without a training intervention, those fifth-graders who organized written, free recall with the same top-level structure as in a test passage performed better than their peers. However, unless trained to do so, none organised themselves in this way on all presenting tests. It seems that without specific instruction, children of this age are unlikely to be consistent in producing the target strategy on occasions when it is an appropriate learning tool. Consequently, there may be great variation in the comprehension and recall performances of younger readers who are only occasionally strategic. On occasions when the strategy is produced, much will be remembered and gist information will be recalled. On occasions when the strategy is not produced, lesser performances will be demonstrated in memory and comprehension behaviours.

Teacher Ratings

Teacher ratings of students' competency in reading were not predictive of strategic use of top-level structure made by fifth-graders. An occasional application of the strategy by fifth-graders must provide confusing information to teachers about the reading ability of those students. Variable memory and comprehension performance related to sporadic production may well impede teachers from forming a valid and reliable opinion of childrens' reading competence. This source of confusion may underlie the lack of association found in the study between teacher ratings and both use of the target strategy and memory performance.

Lack of association might result also if teachers are unaware of the organizational strategy and of its importance for memory and comprehension performances. Alternatively, it may be that teachers aware of the strategy do not include it among criteria for reading competence. It is possible that some teachers form opinions of their students' ability based on oral reading skills such as fluency and intonation at the expense of organizational reading skills such as application of the target strategy.

A small but significant association was found between teacher ratings and memory performance of students prior to the instructional intervention. Those considered most able readers by the teachers tended to be students who remembered relatively little of what they read. This finding provides some support for a speculation that teachers overemphasize oral reading skills in evaluating the reading ability of fifth-graders. However, no association was found after students had been trained to use a strategy which facilitated memory performance. Certainly, further investigation of criteria teachers set in judging students' reading ability appears warranted if lack of associations found in the present study is to be more clearly explained.

Effects of Training

Fifth-graders are sensitive to training in strategic use of top-level structure from text. Training is likely to have three outcomes. First, more readers will use the strategy. Second, the strategy will be applied more consistently across retelling performances. And third, those who use it will improve memory and comprehension performances from pre-use levels, and will perform better than non-users.

In the present study, training raised level of use to 80% from 30% determined prior to the intervention. The higher incidence was maintained across two performances and gives evidence of more stable application than for untrained subjects.

The three outcomes have definite educational implications. A wider-spread, more consistent production of the strategy generally will result in improved individual and class performances. Students will have a systematic approach for selecting and retrieving information from text in tasks involving reading. Class teachers associated with the training intervention felt that fifth-graders in accord with instructional objectives became increasingly aware of pattern in text and of the use of that knowledge in searching for text structure before, during, and after reading. This development occurred even for those who had used the strategy prior to instruction. The teachers' observation is supported by the higher frequencies of respondents able to identify text structure in probes following the intervention.

Two specific consequences of this development were commented on by teachers in the present study. First, students acquired a means of coping with poorly-organized text. By applying one of the top-level structures covered during instruction to muddled passages, readers had a strategy for reorganizing information in a more meaningful and memorable way. Second, when asked to generate their own written composition on topics

both in and beyond the instructional program many students utilized the four top-level structures as an organizational framework. Teachers indicated that this approach resulted in marked benefits for quality of student work, especially with project material. Their subjective appraisal is similar to that of teachers who have used variations of the program with other populations (Bartlett, 1979; Bartlett & Briese, 1979).

Levels of Strategic Application

A large group of fifth graders spontaneously apply the target strategy, albeit inconsistently. The incidence of 30% is similar to that recorded by Elliott (1980) who found one in four sixth-graders utilized the organizational format of reading material. However, few seem to be aware of what it is they are doing when they use the strategy. It may be that such unconscious action should not be termed, *strategic*. Nonetheless, it results in an intermediate level of memory and comprehension performance between those for children aware of what they are doing and for children who do not use the format at all. The finding is recurrent regardless of grade level or age of the strategists (Bartlett, Note 4).

Perhaps probes used have been inadequate for proper insight into the meta-processes in these readers. However, it is also possible that in developing a systematic approach to reading for memory and understanding, readers are variable in conscious awareness of the approach, or in ability to verbalize the approach, or in both characteristics. Whatever explanation, use of the same top-level structure as that of a text can be stratified in terms of its effectiveness. Those able to indicate awareness of their action outperform those who do not or can not so indicate. Both groups outperform those who use an alternative top-level structure or who make no apparent use of structure. Such stratification is considered indicative of levels of strategic application.

Gains Made by Control Subjects

Readers in the control group demonstrated more widespread use of the strategy on posttest retellings than on pretest. Accompanying this change was a substantial improvement in memory performance.

Origins of improvement may be in a practice effect associated with prior exposure to the passage at pretest. Readers capable of producing the strategy might have been more likely to do so having previously read the same content organized within the same structural framework.

If this is the case, then a similar explanation might be advanced for part of the gains made by trained subjects. However, the significant effect found for treatment group in an analysis of covariance conducted on posttest recall, and the more significant advance made in use of the strategy by trained readers, indicate an effect beyond that of practice.

Nonetheless, improvement by the control suggests that familiarity with a passage of text may be an important influence on production of the target strategy and better recall performance by production-inefficient fifth-graders. As such the variable may behave similarly with expository text as was suggested for narrative text by Thorndyke (1977). The proposal seems a useful area for further research.

CONCLUSION

Both objective data from a scoring of students' written records and subjective impressions of teachers delivering the program are the basis for a conclusion that readers in fifth grade are able to approach strategically the task of learning from classroom text by using an awareness of text structure. The approach, albeit one which many cannot verbalize, is used inconsistently by 30% of fifth graders. A more consistent and productive use can be established for this group and for others who have not previously applied the strategy through specific and intensive instruction. Outcomes of instruction are that about 80% of those taught will acquire and use the strategy, and that performance in remembering and understanding what is read in expository text will improve significantly.

There appears little relation between a student's application of the strategy, or performance in verbatim recall of text information, and teacher rating of the student's reading ability. It was speculated that this may be a result of confusing information given about reading ability by an inconsistent, natural production of the strategy. It was also suggested that lack of association between the variables may be because teachers base opinions on competency in reading on criteria which exclude or devalue students' organizational skills such as a strategic use of knowledge about top-level structure.

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TABLE 1

PERFORMANCE OF EXPERIMENTAL AND CONTROL GROUPS IN RECALLING A TEST PASSAGE BEFORE AND AFTER AN INTERVENTION

GROUP	PRETEST		IMMEDIATE POSTTEST		DELAYED POSTTEST	
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
Experimental	10.56	6.63	21.88	6.62	20.16	6.00
Control	10.72	5.74	14.59	6.71	13.28	5.94

TABLE 2

SPEARMAN'S RHO COEFFICIENTS DEPICTING RELATION BETWEEN RECALL PERFORMANCE AND USE OF TOP-LEVEL STRUCTURE

GROUP	PRETEST	IMMEDIATE POSTTEST	DELAYED POSTTEST
Experimental	.62*	.66*	.57*
Control	.84*	.71*	.82*

* $p > .001$

TABLE 3

TOP-LEVEL ORGANIZATION USED BY SUBJECTS IN THE EXPERIMENTAL GROUP IN RECALLING A TEST PASSAGE BEFORE AND AFTER AN INTERVENTION

TOP-LEVEL STRUCTURE USED TO ORGANIZE RECALL		PRETEST	IMMEDIATE POSTTEST	DELAYED POSTTEST
Level	Description			
7	Same as test passage, & identified that used	4	14	8
6	Same as test passage, but incorrect/no identification	2	6	13
	TOTAL	6	20	21
5	Different from test passage, but identified the structure used in recall	1	2	4
4	Different from test passage, and identified structure other than that used in recall	0	2	0
3	Different from test passage, and no identification	0	0	0
	TOTAL	1	4	4
2	None, but identified a structure	10	1	0
1	None, no identification	8	0	0
	TOTAL	18	1	0

TABLE 4

TOP-LEVEL ORGANIZATION USED BY SUBJECTS IN THE CONTROL GROUP IN RECALLING A TEST PASSAGE BEFORE AND AFTER AN INTERVENTION

TOP-LEVEL STRUCTURE USED TO ORGANIZE RECALL		PRETEST	IMMEDIATE POSTTEST	DELAYED POSTTEST
Level	Description			
7	Same as test passage, & identified that used	1	6	6
6	Same as test passage, but incorrect/no identification	9	10	9
	TOTAL	10	16	15
5	Different from test passage, but identified the structure used in recall	4	4	1
4	Different from test passage, and identified structure other than that used in recall	0	0	0
3	Different from test passage, and no identification	0	0	0
	TOTAL	4	4	1
2	None, but identified a structure	5	6	7
1	None, no identification	10	3	6
	TOTAL	15	9	13